



Early relations between language development and the quality of mother–child interaction in very-low-birth-weight children



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ABSTRACT

Background: It is not clearly understood how the quality of early mother–child interaction influences language development in very-low-birth-weight children (VLBW).

Aims: We aim to analyze associations between early language and the quality of mother–child interaction, and, the predictive value of the features of early mother–child interaction on language development at 24 months of corrected age in VLBW children.

Study design: A longitudinal prospective follow-up study design was used.

Methods: The participants were 28 VLBW children and 34 full-term controls. Language development was measured using different methods at 6, 12 and at 24 months of age. The quality of mother–child interaction was assessed using PC-ERA method at 6 and at 12 months of age.

Results: Associations between the features of early interaction and language development were different in the groups of VLBW and full-term children. There were no significant correlations between the features of mother–child interaction and language skills when measured at the same age in the VLBW group. Significant longitudinal correlations were detected in the VLBW group especially if the quality of early interactions was measured at six months and language skills at 2 years of age. However, when the predictive value of the features of early interactions for later poor language performance was analyzed separately, the features of early interaction predicted language skills in the VLBW group only weakly.

Conclusions: The biological factors may influence on the language development more in the VLBW children than in the full-term children. The results also underline the role of maternal and dyadic factors in early interactions.

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1. Introduction

The interest on early language development of the children born at low gestational age (<32 gestational weeks) and/or with very-low-birth-weight (≤ 1500 g; VLBW) has grown during the last decade [1–4]. These children as a group have been shown to have weaker language skills at the end of the second year than full-term children [1,4]. The difference in language skills between the groups of preterm and full-term children has also been shown to increase as children grow [5–7]. It is not clearly understood what factors are influencing on the language development in preterm children. For example, it is not known in detail what kind of influence the quality of early

mother–child interaction has on the early language development in VLBW children.

It is controversial if there are differences between early mother–child interactions in preterm and full-term children [8–10]. There are many reasons why early interactions of preterm children and their mothers may differ from those of the full-term children. Women build up mental representations of being a mother during the pregnancy. The preterm birth interrupts this process. An interrupted representation process as well as traumatic birth experience and early separation may influence early mother–child interaction of the preterm child and her mother [11]. Mothers of the preterm children have been reported to suffer from distress and stress more often than mothers of full-term children [8,9], and this has also been shown to influence the mother–child interaction [8]. On the other hand, preterm children have been shown to have more problems with self-regulation and more stress than full-term children at least in the middle of the first year [12]. In addition, the prevalence of neurodevelopmental impairments has been shown to be higher among preterm children if compared to full-

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term children [13,14]. Preterm children may also suffer from physical diseases such as respiratory distress syndrome and bronchopulmonary dysplasia, or they may have intraventricular hemorrhage at an early age. All of these matters may contribute to the infant attachment, maternal attachment representation and to the early interactions between a preterm child and a caregiver [15]. The child's capacity to participate in communication may influence maternal interactive behavior: the problems in communication and development may make it difficult for the mother to build reciprocal interchanges with the baby.

Language develops in the interaction. It is unclear which of the following factors, maternal, infant or dyadic, are critical when aiming to support preterm children's language development. Some findings have been presented [16–18]. Mother's sensitivity and consistent responsiveness [16,17] and the mother's use of attention-focusing gestures with relevant descriptive speech in mother–child interactions [18] have been shown to support later cognitive-language/language performance of preterm children. On the other hand, very early intervention did not have an effect on preterm children's communication skills at 12 months of age [19]. The intervention in this study aimed to support parent's positive representations of her child and to help the parent to be responsive and sensitive to her child's needs [19]. Furthermore, it is not clearly understood if there are critical time windows for the language development of preterm children during the first years of life [20,21]. This information would be helpful when planning the timing of early intervention for preterm children.

In our earlier study of nearly the same, slightly larger group of children as described here, the quality of mother–child interaction was nearly comparable between the groups of VLBW and full-term children at 6 and 12 months of age [10]. The only differences that were found between the groups were in two infant factors (infant's sober and withdrawn mood, infant's quality of play, interest and attention) at twelve months of age. However, despite the fact that the quality of mother–child interactions was mostly parallel, VLBW children had acquired significantly less words to their receptive lexicon [4] and less gestures [22] between 9, 12 and 15 months of age. In addition, VLBW children used less inflectional morphology in their spontaneous speech in mother–child interactions [23] and had weaker language performance when measured using a formal test at two years of age than full-term controls [4]. Based on these earlier findings, in the present prospective longitudinal study we aimed to analyze of how the quality of early mother–child interaction and early language development are associating with each other in the VLBW children. We also wanted to analyze the predictive value of the quality of early mother–child interaction on language development of VLBW children. The aim was also to get information of what features of early mother–child interaction (maternal/infant/dyadic factors) are critical for the early language development in VLBW children.

2. Methods

2.1. Participants

The subjects were 28 VLBW children (birth weight \leq 1500 g) and their 34 full-term controls ($>$ 37 gestational age). The VLBW children were born in Turku University Hospital between 7/2001 and 5/2005. The controls were born between 11/2001 and 4/2002. All 62 children were their mother's first-born children and were growing in Finnish speaking monolingual families.

The group of VLBW children is heterogeneous as was the present sample as well. Four VLBW children in the present sample had a diagnosis of bronchopulmonary dysplasia (BPD) (see Table 1 for the background characteristics). Three VLBW children had a neurological diagnosis (cerebral palsy, hearing impairment, cognitive development impairment) at two years corrected age. All full-term children were developing normally. There were more children with weak cognitive development measured using Mental Developmental Index value (MDI) of Bayley Scales of Infant Development-II [24] at two years of

Table 1

Background characteristics of the very-low-birth-weight (VLBW) and full-term (FT) children. The values presented are numbers and percentages of the children. If mean, standard deviation or median values are used, it is marked separately.

	VLBW children N = 28	FT children N = 34
	n (%)	n (%)
Birth weight (g); mean (SD)	1048 (264)	3550 (408)
Gestational age in weeks; mean (SD)	28 (2)	40 (1)
Females/males	10 (18)/36 (64)	16 (18)/47 (53)
Apgar 5 min.; median	8	9
Bronchopulmonary dysplasia	4 (14)	–
Cerebral palsy	1 (4)	–
Hearing impairment	1 (4)	–
MDI < 70 (–2 SD) at 2;0	1 (4)	–
RDLS III < 70 (–2 SD) at 2;0	1 (4)	–
RDLS III between 70 and 85 (–2 SD) at 2;0	9 (32)	1 (3)
<i>Mother's basic education</i>		
<9 years	–	–
9–12 years	9 (33)	9 (27)
>12 years	18 (67)	25 (73)

MDI – mental developmental index in Bayley Scales of Infant Development II; RDLS III – Reynell Developmental Language Scores III.

Note: the information on mother's basic education was available from 27 VLBW children only.

age in the VLBW group than in the control group. In addition, there were more VLBW children in the present sample with weak language skills when measured using the Reynell Developmental Language Scales III (RDLS) ([29,30], see also 4) at two years of age if compared to the full-term children's group (Table 1). The present groups did not differ in terms of mothers' basic education, $\chi^2(1) = 0.34, p = 0.56$.

2.2. Measures

2.2.1. Early language development

The development of early vocalizations during the first year was followed using the Checklist for the Development of Early Vocalizations (CDEV) [25]. Detailed information on data collection is presented in our earlier study [26]. The CDEV is a structured maternal report method and it has been validated in a sample of Finnish children (N = 88) [25]. The information of the use of reduplicative babbling strings (e.g./nananana/or/bababababa/) at 6 months of age (yes/no; corrected age for VLBW children) was used in the present study.

The information on early lexical development at 12 and at 24 months of age (corrected ages for VLBW children) was gathered using the Finnish version of the MacArthur Communicative Development Inventory (CDI; FinCDI) [27,28]. The FinCDI is a structured maternal rating method and it has been validated in a sample of Finnish children (N = 95) [27]. The detailed information on how the data was gathered is presented in our earlier study [4]. The following data was used in the present study: receptive and expressive lexicon size at 12 months of age, and expressive lexicon size at 24 months of age.

The information on early grammatical development at 24 months of age (corrected age for VLBW children) was gathered using the FinCDI and by analyzing child's spontaneous speech in videotaped mother–child interactions (see [23] for the detailed information on the data collection). The following grammatical data was used in the present study: the utterance length (i.e. the mean length of the three longest utterances calculated in morphemes, M3L value) and the number of different morphological endings that a child was using during the ten minute sample of mother–child interaction.

Language skills were assessed using the RDLS III ([29,30], see also 4) at two years of corrected age. The RDLS is a well-known language test including a scale for receptive and expressive language skills, and it has been validated for Finnish children [30]. Both scales were used in the present study.

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